

## DOOR FOR DRUM TYPE WASHING MACHINES

### 【Technical Field】

The present invention relates to a washing machine, and more particularly, to a door for  
5 drum type washing machines with a decorative band, by which the drum type washing machine has a more beautiful outer appearance.

### 【Background Art】

A washing machine is a machine that removes contaminants from laundry using  
10 emulsification of detergent and friction between the laundry and washing water based on rotation of a motor. That is, the washing machine performs a washing operation of the laundry. In addition, the washing machine performs a rinsing operation of the laundry and a spin-drying operation of the laundry. Generally, the washing machine performs washing, rinsing, and spin-drying operations in sequence to clean laundry.

15 The washing machine comprises: a power unit, such as a motor, a power transmission unit for transmitting energy to laundry or washing water; a control unit for controlling a washing operation; a washing tub for receiving laundry and washing water to perform the washing operation; a water supply unit for supplying washing water to the washing tub; and a water drainage unit for draining washing water out of the washing tub.

20 Based on how to wash laundry, washing machines are classified into a drum type washing machine, an agitator type washing machine, and a pulsator type washing machine.

The agitator type washing machine is a machine that rotates a blade-shaped agitator vertically disposed in the center of a washing tub in alternating directions to wash laundry.

The pulsator type washing machine is a machine that rotates a disc-shaped pulsator to  
25 generate water currents, by which laundry is washed. The drum type washing machine is

a machine that rotates a drum, in which washing water, detergent, and laundry are received, at low speed such that the laundry is lifted by a plurality of protrusions formed at the inside of the drum and then falls from the protrusions, and therefore, the laundry is washed. When laundry is washed in the drum type washing machine, damage to the laundry is minimized, and water consumption is reduced. Recently, therefore, the drum type washing machine has been increasingly used.

FIG. 1 is a perspective view illustrating the outer appearance of a conventional drum type washing machine 10.

Referring to FIG. 1, the conventional drum type washing machine 10 comprises: a cabinet 11 forming the outer appearance of the washing machine 10; a door 20 mounted at the center part of the front surface of the cabinet 11; a detergent box 12 disposed at the upper part of the front surface of the cabinet 11 for storing detergent used to wash laundry; and a control unit 13 for controlling the operation of the washing machine 10.

The door 20 comprises: a circular door frame 21 forming the outer appearance of the door 20; a decorative band 22 disposed at the edge of the front surface of the door frame 21; and a door glass 23 mounted inside the decorative band 22 such that the door glass 23 is protruded inward.

The door glass 23 is protruded inward toward the interior of the washing machine 10.

The door glass 23 is made of a transparent material such that a user can easily and conveniently watch laundry rotated in a drum through the door glass 23.

When the user fills detergent in the detergent box 12 of the drum type washing machine 10 with the above-stated construction, puts laundry into the drum, and manipulates a power button and a washing mode selection dial disposed on the control unit 13, a washing operation is initiated.

After the washing operation is completed, a drying operation is performed. After the drying operation is completed, the rotation of the drum mounted in the washing machine 10 is stopped. After the rotation of the drum is stopped, the user opens the door 20 to remove the washed and dried laundry from the drum.

- 5 In the door with the above-stated construction, the door frame and the decorative band generally have different lusters, by which the front surface of the washing machine has a beautiful outer appearance. In addition, the decorative band is attached to the front surface of the door by a double-sided adhesive tape.

Specifically, the edge of the front surface of the door frame is lusterless by virtue of the  
10 decorative band, and the remainder of the door frame is lustrous.

If the decorative band is not provided, it is difficult to divide the front surface of the door frame into a lustrous part and a lusterless part. Therefore, the simplest way to divide the front surface of the door frame into the lustrous part and the lusterless part is to attach the decorative band, which has a different luster property from that of the door frame, to the  
15 door frame.

When the decorative band is attached to the door frame by means of the double-sided adhesive tape to provide a beautiful appearance to the front surface of the door frame of the conventional door with the above-stated construction, however, the following problems are caused.

- 20 With the lapse of time, the adhesive strength of the double-sided adhesive tape is decreased, and as a result, the decorative band is separated from the door frame. When the interior temperature of the washing machine is increased to high temperature to perform a drying operation, the decrease in adhesive strength of the double-sided adhesive tape is accelerated, and therefore, the decorative band is more easily separated from the  
25 door frame.

After the decorative band is separated from the door frame, the double-sided adhesive tape remains on the surface of the door frame where the decorative band is attached. As a result, the beautiful appearance of the front surface of the door frame is deteriorated. In other words, the attachment of the decorative band rather spoils the beautiful appearance of the front surface of the door frame than provides the front surface of the door frame with a beautiful appearance.

**【Disclosure】**

**【Technical Problem】**

The present invention is directed to a door for drum type washing machines that substantially obviates one or more problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide a door for drum type washing machines wherein a decorative band is permanently attached to a door frame by means of improved engagement between the decorative band and the door frame.

Another object of the present invention is to provide a drum type washing machine with the above-stated door.

**【Technical Solution】**

To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a door for drum type washing machines comprises: a door frame formed by injection molding; and a decorative band inserted in a mold by an insert injection method when the door frame is formed by injection molding such that the decorative band is attached to the front surface of the door frame.

Preferably, the decorative band is attached to the edge of the front surface of the door frame, and the decorative band comprises: a front surface exposed to the front surface of

the door frame; a rear surface attached to the door frame; and side surfaces surrounding the front and rear surfaces, the side surfaces forming the thickness of the decorative band.

Preferably, the side surfaces of the decorative band are inserted into the door frame by the thickness of the decorative band when the decorative band is attached to the door frame.

5 Specifically, it is preferable that no step is formed between the door frame and the decorative band when the decorative band is attached to the door frame. This is because the adhesive strength of the decorative band may be decreased by the step formed between the door frame and the decorative band, and the beautiful appearance of the door may be deteriorated by the step formed between the door frame and the decorative band.

10 Preferably, the decorative band is substantially formed substantially in the shape of a ring, and the decorative band is provided at the inside and outside surfaces thereof with at least one fixing hole having a predetermined depth. Alternatively, the at least one fixing hole may be formed at the inside or outside surface of the decorative band.

Also, the decorative band is provided at the inside and outside surfaces thereof with at  
15 least one fixing groove having a predetermined depth, and the at least one fixing groove extends a predetermined length along the circumference of the decorative band. Alternatively, the at least one fixing groove may be formed at the inside or outside surface of the decorative band.

Preferably, the door frame and the decorative band have different lusters such that the door  
20 has a beautiful appearance. For example, the decorative band may be metallicity lusterless. Alternatively, the decorative band may be made of a metal material.

In another aspect of the present invention, a door for drum type washing machines comprises: a door frame formed by injection molding; a decorative band inserted in a mold by an insert injection method when the door frame is formed by injection molding such  
25 that the decorative band is attached to the front surface of the door frame; and a door glass

disposed at the edge of the inner circumferential surface of the door frame, the door glass being made of a transparent material.

Preferably, the door frame and the decorative band have different lusters such that the door has a beautiful appearance. For example, the decorative band may be made of a metal material. Alternatively, the decorative band may be metallically lusterless.

Preferably, the decorative band is attached to the edge of the front surface of the door frame, and the decorative band comprises: a front surface exposed to the front surface of the door frame; a rear surface attached to the door frame; and side surfaces surrounding the front and rear surfaces, the side surfaces forming the thickness of the decorative band.

10 Preferably, the side surfaces of the decorative band are inserted into the door frame by the thickness of the decorative band when the decorative band is attached to the door frame. Specifically, it is preferable that no step is formed between the door frame and the decorative band when the decorative band is attached to the door frame. This is because the adhesive strength of the decorative band may be decreased by the step formed between  
15 the door frame and the decorative band, and the beautiful appearance of the door may be deteriorated by the step formed between the door frame and the decorative band.

Preferably, the decorative band is substantially formed in the shape of a ring, and the decorative band is provided at the inside and outside surfaces thereof with at least one fixing hole having a predetermined depth. Alternatively, the at least one fixing hole may  
20 be formed at the inside or outside surface of the decorative band.

Also, the decorative band is provided at the inside and outside surfaces thereof with at least one fixing groove having a predetermined depth, and the at least one fixing groove extends a predetermined length along the circumference of the decorative band.

Alternatively, the at least one fixing groove may be formed at the inside or outside surface  
25 of the decorative band.

In yet another aspect of the present invention, a drum type washing machine comprises: a cabinet forming the outer appearance of the washing machine; a front cover mounted at the front surface of the cabinet; a control panel disposed at the upper part of the front cover; a control unit disposed at the front surface of the control panel for controlling the operation  
5 of the washing machine and inputting washing conditions; and a door disposed at the center part of the front cover such that the door can be opened when laundry is to be put into the washing machine, wherein the door comprises: a door frame formed by injection molding; and a decorative band inserted in a mold by an insert injection method when the door frame is formed by injection molding such that the decorative band is attached to the  
10 front surface of the door frame.

Preferably, the door further comprises: a door glass disposed at the edge of the inner circumferential surface of the door frame, and the door glass is made of a transparent material such that a user can watch the interior of the drum type washing machine through the transparent door glass to confirm the washing process.

15 Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims  
20 hereof as well as the appended drawings

It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

### **【Advantageous Effects】**

According to the present invention, the decorative band is permanently attached to the door frame by means of improved engagement between the decorative band and the door frame. Consequently, the present invention has the effect of providing the washing  
5 machine with a beautiful outer appearance.

### **【Description of Drawings】**

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate  
10 embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

FIG. 1 is a perspective view illustrating the outer appearance of a conventional drum type washing machine;

15 FIG. 2 is a perspective view schematically illustrating a drum type washing machine with a door according to the present invention;

FIG. 3 is a sectional view taken along line I-I of FIG. 2, illustrating a door frame;

FIGs. 4 and 5 are sectional views illustrating a molding process of the door frame, in which a decorative band according to an embodiment of the present invention is mounted;

20 FIG. 6 is a perspective view illustrating a decorative band according to another embodiment of the present invention, which is mounted in the door frame; and

FIG. 7 is a sectional view illustrating a molding process of the door frame, in which the decorative band of FIG. 6 is mounted.



**【Best Mode】**

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

FIG. 2 is a perspective view schematically illustrating a drum type washing machine 100 with a door according to the present invention.

Referring to FIG. 2, the drum type washing machine 100 comprises: a cabinet 110 forming the outer appearance of the washing machine 100; a front cover 140 mounted at the front surface of the cabinet 110; and a control panel 130 disposed at the upper part of the front cover 140.

At one side of the control panel 130 is disposed a detergent box 120 for storing detergent.

At the front surface of the control panel 130 is disposed a control unit 131 for controlling the operation of the washing machine 100 and inputting washing conditions. A rotary knob is illustrated as an example of the control unit 131 in FIG. 2.

At the center part of the front cover 140 is disposed a door 200, which can be opened such that laundry is put into a drum mounted in the washing machine 100. At the center part of the door 200 is mounted a door glass, which is made of a transparent material. At the edge of the door glass is disposed a door frame. At the front surface of the door frame is attached a decorative band, which is metallicity lusterless.

The decorative band comprises a front surface, a rear surface, and side surfaces. The front surface of the decorative band is a surface exposed to the front surface of the door frame, and the rear surface of the decorative band is a surface attached to the door frame.

The side surfaces of the decorative band surround the front and rear surfaces of the

decorative band. Preferably, the side surfaces of the decorative band are inserted into the door frame when the decorative band is attached to the door frame.

Specifically, it is preferable that no step is formed between the door frame and the decorative band when the decorative band is attached to the door frame. This is because the adhesive strength of the decorative band may be decreased by the step formed between the door frame and the decorative band, and the beautiful appearance of the door may be deteriorated by the step formed between the door frame and the decorative band.

As illustrated in FIG. 2, the decorative band is preferably formed in the shape of a ring. Also preferably, the ring-shaped decorative band is attached to the edge of the door frame.

FIG. 3 is a sectional view taken along line I-I of FIG. 2, illustrating the door frame.

Referring to FIG. 3, the door 200 comprises: a circular door frame 210; and a decorative band 220 attached to the upper surface of the door frame 210. Preferably, the door 200 further comprises: a door glass 230 disposed at the inner circumferential surface of the door frame 210 such that the door glass 230 is protruded inward toward the interior of the washing machine. The door glass 230 is made of a transparent glass material.

The door frame 210 is formed by injection molding of plastic resin. Preferably, the decorative band 220 is integrally formed with the door frame 210 by an insert injection method when the door frame 210 is formed by injection molding.

Using the insert injection method, the decorative band 220 is more securely attached to the door frame 210 than when the decorative band 220 is attached to the door frame 210 by means of the double-sided adhesive tape.

The manufacturing process of the door according to the present invention will be described hereinafter in detail with reference to the accompanying drawings.

FIGs. 4 and 5 are sectional views illustrating a molding process of the door frame 210, in which a decorative band 220 according to an embodiment of the present invention is

mounted.

Referring to FIGs. 4 and 5, the decorative band 220, which is disposed at the edge of the upper surface of the door frame, is manufactured by the above-stated insert injection method.

- 5 More specifically, an upper mold 310 and a lower mold 320 are coupled with each other to manufacture the door frame 210. Before the upper mold 310 is coupled with the lower mold 320, the decorative band 220 is located at a predetermined position of the inner circumferential surface of the lower mold 320.

After the upper mold 310 is coupled with the lower mold 320, a door frame molding space  
10 is formed in the molds 310 and 320. The door frame molding space communicates with a resin injection port 330, through which plastic resin is injected into the door frame molding space.

After the coupling between the upper mold 310 and the lower mold 320 is completed, liquefied plastic resin 340 is injected into the door frame molding space of the coupled  
15 molds 310 and 320 through the resin injection port 330. After the injection of the plastic resin 340 is completed, and a predetermined period of time lapses, the plastic resin 340 injected into the door frame molding space of the coupled molds 310 and 320 is solidified. After the plastic resin is solidified, the upper mold 310 is separated from the lower mold 320, as illustrated in FIG. 5.

- 20 In this way, the door frame 210 is formed, and at the same time, the decorative band is securely attached to the edge of the upper surface of the door frame 210.

The front surface of the decorative band 220 is sanded such that the front surface of the decorative band 220 is lusterless. Alternatively, the front surface of the decorative band 220 may be processed such that a plurality of hairlines are formed on the front surface of  
25 the decorative band 220. As a result, the front surface of the decorative band 220 is

metallically lusterless. On the other hand, the door frame 210 may be processed such that the door frame 210 is lustrous.

Specifically, the front surface of the decorative band 220 is processed such that the front surface of the decorative band 220 is lusterless, and then the decorative band 220 is attached to the door frame 210 by an insert injection method. Subsequently, the door frame 210 is processed such that the door frame 210 is metallically lustrous.

As described above, the decorative band 220 is lusterless, and the door frame 210 is lustrous, to provide the front surface of the door with a beautiful appearance. On the other hand, the decorative band 220 may be lustrous, and the door frame 210 may be lusterless.

Meanwhile, the front surface of the decorative band 220 may be coated with a metal material. Alternatively, the decorative band may be made of a metal material.

#### **【Mode for Invention】**

Now, a decorative band according to another embodiment of the present invention, which is applied to the door for drum type washing machines, will be described in detail with reference to FIGs. 6 and 7.

FIG. 6 is a perspective view illustrating a decorative band 220 according to another embodiment of the present invention, which is mounted in the door frame 210, and FIG. 7 is a sectional view illustrating a molding process of the door frame 210, in which the decorative band 220 of FIG. 6 is mounted.

In the illustrated embodiment, the decorative band 220 has at least one fixing hole 221 of a predetermined depth formed at each side surface of the decorative band 220. Alternatively, the decorative band 220 may have at least one fixing groove of a predetermined length formed at each side surface of the decorative band 220 along the

circumference of the decorative band 220.

If the decorative band 220 is formed in the shape of a ring, the side surfaces of the decorative band 220 comprise an inside surface 224 and an outside surface 225. In this case, at least one fixing hole 221 of the predetermined depth may be formed at the inside surface of the decorative band 220, and at least one fixing hole 221 of the predetermined depth may also be formed at the outside surface of the decorative band 220.

In order to more securely attach the decorative band 220 to the door frame 210, the at least one fixing hole 221 or the at least one fixing groove may be formed at the inside surface 224 and the outside surface 225 of the decorative band 220 such that the at least one fixing hole 221 or the at least one fixing groove formed at the inside surface 224 of the decorative band 220 are symmetrically or asymmetrically opposite to the at least one fixing hole 221 or the at least one fixing groove formed at the outside surface 225 of the decorative band 220.

During insert injection, plastic resin is injected into the at least one fixing hole 221 or the at least one fixing groove of the decorative band 220, and the plastic resin forming the door frame is integrally united with the plastic resin injected into the at least one fixing hole 221 or the at least one fixing groove of the decorative band 220. Consequently, the decorative band 220 is more securely attached to the door frame 210 by means of the fixing hole 221 or the at least one fixing groove.

Instead of the above-described at least one fixing hole or fixing groove, at least one protrusion may be formed at each side surface of the decorative band 220. Specifically, at least one protrusion having a predetermined height may be protruded at each side surface of the decorative band 220.

In this case, the at least one protrusion serves as a fixing pin. The plastic resin forming

the door frame 210 is solidified while surrounding the fixing pin, and therefore, the decorative band 220 is securely attached to the door frame 210.

The decorative band has a front surface 222 exposed to the front surface of the door frame 210 and a rear surface 223 attached to the door frame 210.

5 As illustrated in FIG. 7, the upper mold 310 and the lower mold 320 are prepared to manufacture the door frame 210, and the decorative band 220 is located in the lower mold 320. Subsequently, plastic resin 340 is injected into the coupled molds 310 and 320 through the resin injection port 330.

The plastic resin 340 injected through the resin injection port 330 fills the at least one  
10 fixing hole 221, having the predetermined depth, formed at each side surface of the decorative band 220. After the plastic resin 340 is completely solidified, the upper mold 310 and the lower mold 320 are removed. In this way, the door frame 210 is manufactured.

The plastic resin 340 filled in the at least one fixing hole 221 of the decorative band 220 is  
15 integrally united with the door frame 210. As a result, the plastic resin 340 filled in the at least one fixing hole 221 of the decorative band 220 serves as a fixing pin. Consequently, the decorative band 220 is securely attached to the door frame 210 by means of the at least one fixing hole 221 without using an additional adhesive tape.

The operation of the drum type washing machine with the above-described door according  
20 to the present invention will be described below.

A user opens the detergent box 120 to fill detergent in the detergent box 120, and opens the door 200 to put laundry into the drum. After that, the user pushes the power button and the washing condition input button disposed on the control unit 131 to operate the washing machine.

25 The washing machine performs washing, rinsing, and drying operations based on the input

washing condition. At this time, the user can watch the interior of the drum through the door glass disposed at the door frame 210 to confirm the washing process.

As apparent from the above description, the present invention provides a door for drum type washing machine wherein a decorative band is permanently attached to a door frame  
5 by means of improved engagement between the decorative band and the door frame. Consequently, the present invention has the effect of providing the washing machine with a beautiful outer appearance.

In the illustrated embodiment, the door frame is made of plastic resin, although the material for the door frame is not limited thereto. For example, the door frame may be  
10 made of a metal material which can be melted and shaped by injection molding. In this case, it is required that the melting point of the decorative band be higher than that of the door frame.

It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the  
15 inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

#### **【Industrial Applicability】**

20 According to the present invention, the decorative band is permanently attached to the door frame. Consequently, the present invention has the effect of providing the washing machine with a beautiful outer appearance.